

WHAT IS CLAIMED IS:

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1. A data processing device comprising:
  - a plurality of data processing units;
  - a first memory shared for storing data, to which first memory each of said data processing units makes an access so as to perform an operation;
  - a transfer completion time designation unit for designating a transfer completion time according to need, within which transfer completion time, transferring the data in response to the accesses made by said data processing units should be completed;
  - an expected transfer completion time calculation unit for calculating an expected transfer completion time needed for completing the data transfer in response to the accesses made by said data processing units, said expected transfer completion time calculation unit calculating the expected transfer completion time by taking current access status of said first memory into consideration; and
  - an access management unit for managing the access to said first memory based on the transfer

completion time and the expected transfer completion time.

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2. The device as claimed in claim 1, said device further comprising:

10       a second memory for storing the data stored in said first memory, said second memory having a transfer rate lower than a transfer rate of said first memory; wherein,

15       when the data transfer is executed between said first memory and said second memory, said expected transfer completion time calculation unit calculates the expected transfer completion time by taking the data transfer rates of said first memory and said second memory into consideration.

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3. The device as claimed in claim 1, wherein: when one of the data processing units makes an additional access to said first memory, said access

management unit prevents or postpones the additional access to said first memory when the expected transfer completion time exceeds the transfer completion time.

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4. The device as claimed in claim 1, wherein:  
said data processing device is an image-  
10 forming device provided with one data processing unit as  
an image input unit for inputting image data to said  
first memory and one data processing unit as an image  
output unit for outputting the image data stored in said  
first memory.

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5. A data processing device comprising:  
20 a plurality of data processing means;  
first memory means shared for storing data, to  
which first memory means each of said data processing  
means makes an access so as to perform an operation;  
transfer completion time designation means for  
25 designating a transfer completion time according to need,

within which transfer completion time, transferring the data in response to the accesses made by said data processing means should be completed;

expected transfer completion time calculation  
5 means for calculating an expected transfer completion time needed for completing the data transfer in response to the accesses made by said data processing means, said expected transfer completion time calculation means calculating the expected transfer completion time by  
10 taking current access status of said first memory means into consideration; and

access management means for managing the access to said first memory means based on the transfer completion time and the expected transfer completion  
15 time.

20 6. The device as claimed in claim 5, said device further comprising:

second memory means for storing the data stored in said first memory means, said second memory means having a transfer rate lower than a transfer rate  
25 of said first memory means; wherein,

when the data transfer is executed between said first memory means and said second memory means, said expected transfer completion time calculation means calculates the expected transfer completion time by 5 taking the data transfer rates of said first memory means and said second memory means into consideration.

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7. The device as claimed in claim 5, wherein:  
when one of the data processing means makes an additional access to said first memory means, said access management means prevents or postpones the 15 additional access to said first memory means when the expected transfer completion time exceeds the transfer completion time.

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8. The device as claimed in claim 5, wherein:  
said data processing device is an image-forming device provided with one data processing means 25 as an image input means for inputting image data to said

first memory means and one data processing means as an image output means for outputting the image data stored in said first memory means.

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9. A program for executing on a computer to perform the functions of:
  - 10 a plurality of data processing units;
  - a first memory shared for storing data, to which first memory each of the data processing units makes an access so as to perform an operation;
  - a transfer completion time designation unit
  - 15 for designating a transfer completion time according to need, within which transfer completion time, transferring the data in response to the accesses made by said data processing units should be completed;
  - an expected transfer completion time
  - 20 calculation unit for calculating an expected transfer completion time needed for completing the data transfer in response to the accesses made by said data processing units, said expected transfer completion time calculation unit calculating the expected transfer
  - 25 completion time by taking current access status of said

first memory into consideration; and  
an access management unit for managing the  
access to said first memory based on the transfer  
completion time and the expected transfer completion  
5 time.

10 10. A computer-readable recording medium  
storing a program for executing on a computer to perform  
the functions of:  
a plurality of data processing units;  
a first memory shared for storing data, to  
15 which first memory each of the data processing units  
makes an access so as to perform an operation;  
a transfer completion time designation unit  
for designating a transfer completion time according to  
need, within which transfer completion time,  
20 transferring the data in response to the accesses made  
by said data processing units should be completed;  
an expected transfer completion time  
calculation unit for calculating an expected transfer  
completion time needed for completing the data transfer  
25 in response to the accesses made by said data processing

units, said expected transfer completion time calculation unit calculating the expected transfer completion time by taking current access status of said first memory into consideration; and

5                   an access management unit for managing the access to said first memory based on the transfer completion time and the expected transfer completion time.

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11. An image-forming device comprising:  
an image input unit;  
15                   an image output unit;  
a storage unit for storing an image signal provided from said image input unit in a primary storage part, and storing the image signal stored in the primary storage part in a secondary storage part;  
20                   a delivering unit for delivering the image signal stored in the primary storage part, which image signal is read out from the secondary storage part, to said image output unit; and  
a priority designation unit for designating  
25                   priority for each of a plurality of image signal

input/output operation requests.

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12. The image-forming device as claimed in  
claim 11, said device further comprising:

a request acceptance unit for accepting the  
image signal input/output operation requests;

10 a processing order control unit for  
determining a processing order of the image signal  
input/output operation requests based on respective  
priorities designated by said priority designation unit;  
and

15 an interruption/resumption control unit for  
interrupting a current image signal input/output  
operation request when the priority of the current image  
signal input/output operation request is lower than a  
highest priority of an image signal input/output  
20 operation request among the image signal input/output  
operation requests, and for resuming the current image  
signal input/output operation request after completion  
of the image signal input/output operation request with  
the highest priority.

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13. The image-forming device as claimed in  
claim 12, said device further comprising:

a selection unit for selectively executing the  
control of said processing order control unit and said  
5 interruption/resumption control unit.

10 14. An image-forming device comprising:

image input means;

image output means;

storage means for storing an image signal  
provided from said image input means in a primary  
15 storage part, and storing the image signal stored in the  
primary storage part in a secondary storage part;

delivering means for delivering the image  
signal stored in the primary storage part, which image  
signal is read out from the secondary storage part, to  
20 said image output means; and

priority designation means for designating  
priority for each of a plurality of image signal  
input/output operation requests.

15. The image-forming device as claimed in  
claim 14, said device further comprising:

request acceptance means for accepting the  
image signal input/output operation requests;

5 processing order control means for determining  
a processing order of the image signal input/output  
operation requests based on respective priorities  
designated by said priority designation means; and

interruption/resumption control means for  
10 interrupting a current image signal input/output  
operation request when the priority of the current image  
signal input/output operation request is lower than a  
highest priority of an image signal input/output  
operation request among the image signal input/output  
15 operation requests, and for resuming the current image  
signal input/output operation request after completion  
of the image signal input/output operation request with  
the highest priority.

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16. The image-forming device as claimed in  
claim 15, said device further comprising:

25 selection means for selectively executing the

control of said processing order control means and said interruption/resumption control means.

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17. A data processing device comprising:
  - a plurality of data processing units;
  - a first memory shared for storing data, to
  - 10 which first memory each of said data processing units makes an access so as to perform an operation;
  - a transfer completion time designation unit for designating a transfer completion time according to need, within which transfer completion time,
  - 15 transferring the data in response to the accesses made by said data processing units should be completed;
  - an expected transfer completion time calculation unit for calculating an expected transfer completion time needed for completing the data transfer
  - 20 in response to the accesses made by said data processing units, said expected transfer completion time calculation unit calculating the expected transfer completion time by taking current access status of said first memory into consideration;
  - 25 an access management unit for managing the

access to said first memory based on the transfer completion time and the expected transfer completion time; and

5       a priority designation unit for designating priority for each of the accesses made by said data processing units.

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18. A data processing device comprising:  
a plurality of data processing means;  
first memory means shared for storing data, to which first memory each of said data processing means  
15       makes an access so as to perform an operation;  
transfer completion time designation means for designating a transfer completion time according to need, within which transfer completion time, transferring the data in response to the accesses made by said data processing means should be completed;  
expected transfer completion time calculation means for calculating an expected transfer completion time needed for completing the data transfer in response to the accesses made by said data processing means, said  
25       expected transfer completion time calculation means

calculating the expected transfer completion time by taking current access status of said first memory means into consideration;

access management means for managing the  
5 access to said first memory means based on the transfer completion time and the expected transfer completion time; and

priority designation means for designating priority for each of the accesses made by said data  
10 processing means.

15 19. A data processing device comprising:  
a unit for receiving a plurality of data transfer process requests;  
a unit for calculating a required process time necessary for executing all data transfer processes  
20 corresponding to the data transfer process requests in a time-sharing process manner, when at least one data transfer process has a time constraint; and  
a unit for executing in the time-sharing process manner all data transfer processes except for  
25 data transfer processes that should be excluded from

those data transfer processes to be executed for the purpose of satisfying the time constraint, when the calculated required process time exceeds the time constraint for the relevant at least one data transfer 5 process.

10 20. The data processing device as claimed in claim 19, wherein:

15 said unit for executing in the time-sharing process manner all data transfer processes except for data transfer processes that should be excluded from those data transfer processes to be executed for the purpose of satisfying the time constraint selects the data transfer processes to be excluded from those data transfer processes to be executed for the purpose of satisfying the time constraint based on predetermined 20 priority information provided to respective data transfer processes.

21. The data processing device as claimed in  
claim 20, wherein:

the data transfer processes that should be  
excluded comprise those data transfer processes having a  
5 lower priority in said predetermined priority  
information.

10 22. A data processing device comprising:  
means for receiving a plurality of data  
transfer process requests;  
means for calculating a required process time  
necessary for executing all data transfer processes  
15 corresponding to the data transfer process requests in a  
time-sharing process manner, when at least one data  
transfer process has a time constraint; and  
means for executing in the time-sharing  
process manner all data transfer processes except for  
20 data transfer processes that should be excluded from  
those data transfer processes to be executed for the  
purpose of satisfying the time constraint, when the  
calculated required process time exceeds the time  
constraint for the relevant at least one data transfer  
25 process.

23. The data processing device as claimed in  
claim 22, wherein:

    said means for executing in the time-sharing  
process manner all data transfer processes except for  
5    data transfer processes that should be excluded from  
those data transfer processes to be executed for the  
purpose of satisfying the time constraint selects the  
data transfer processes to be excluded from those data  
transfer processes to be executed for the purpose of  
10   satisfying the time constraint based on predetermined  
priority information provided to respective data  
transfer processes.

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24. The data processing device as claimed in  
claim 23, wherein:

    the data transfer processes that should be  
20   excluded comprise those data transfer processes having a  
lower priority in said predetermined priority  
information.